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Apparatus for transferring membranes to a continuously operable sealing carrousel for the heat sealing of can-like packaging materials

Background of the Invention

Field of the Invention

The invention relates to an apparatus for transferring membranes to a continuously operable sealing carrousel for the heat sealing of can-like packaging materials, a rotatable transfer station being arranged upstream of the sealing carrousel.

These can-like containers may contain dried products or pulverulent material.

DE 41 19 656 A1 discloses an arrangement for feeding insert parts into a production station with a continuously moveable workpiece carrier. Can parts are conveyed, at a distance apart from one another, in the continuously moveable workpiece carrier, the intention being for said can parts to be fitted, for example, with a can base or insert part. In this case, starting from a storage station for can bases, the prefabricated bases are transferred to a feed arrangement comprising a stationary part and a pivotably moveable part which, by means of a so-called tool carrier, which can be pivoted in pendulum fashion, and via a likewise pivotably mounted carry-along means, receives prefabricated can bases and positions them continuously on the cans.

Although this is based on the insert parts/can bases/tops consisting of relatively stable materials, it is nevertheless also possible for unstable insert parts, such as flexible sheet blanks, which have to be retained precisely during transfer and during insertion, to be introduced into a production station and inserted into workpieces there.

One disadvantage of this method of fitting insert parts into a continuously operated production station is that it is based on a storage station for insert parts which, depending on the capacity, needs to be filled with insert parts.

A further disadvantage is the necessary temporary coupling between the apparatus for transferring insert parts and the tool carrier. Both said transfer apparatus and the tool carrier each need to be restored into the starting position in order to ensure that they are refitted with insert parts.
While it is thus the case in the production station, which may also be a round workpiece table, that the workpiece table is moved continuously, the tool carrier, which has deposited the insert parts on the workpiece carrier, always has to execute anew movement in the opposite direction into its starting position.

The operation of receiving insert parts from the storage station into the transfer apparatus requires a starting position, as does the operation of transferring the insert parts into the tool station, temporary coupling between the tool station and the workpiece station being necessary for transfer of the insert parts from the tool station into the workpiece station. Thereafter, with the transfer of insert parts into the workpiece station, uncoupling of the tool station, with a return movement, is necessary.

These discontinuous coupling, uncoupling and forward and return movements of the transfer apparatus and tool station creates pendulum movements in opposite directions, which do not allow a production station to operate at a overly high speed.

DE 295 17 440 U1 also discloses an apparatus for the heat sealing of can-like packaging materials. Receiving

pockets for receiving and carrying along can bodies are arranged in a sealing carrousel, a magazine for a number of sealable cardboard bases being provided laterally on the carrousel, and the cardboard bases then being moved, via a suction-extraction arrangement acting from beneath, from said magazine to a rotatable transfer station, which then transfers the separated cardboard bases continuously to the forming ring of the sealing carrousel.

Although pendulum or return movements do not occur here, it is likewise a disadvantage of this apparatus that the sealable cardboard bases have to be received from a magazine which has a limited cardboard-base stacking height.

Accordingly, after a relatively short period of time, the magazine has to be constantly refilled with cardboard bases if the continuous sealing process is not to be interrupted.
Moreover, use of the abovementioned apparatus for advancing extremely thin closure parts, such as membranes, cannot readily be realized since the separation of such thin workpieces obviously requires high outlay in terms of equipment and monitoring in order for it not to be possible, for example, for any doubles to be advanced.

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Summary of the Invention

Taking this prior art as the departure point, the object of the invention is to provide an apparatus which is intended for transferring membranes to a continuously operable sealing carrousel for the heat sealing of can-like packaging materials, having a rotatable transfer station arranged upstream, and which allows a higher throughput speed of the sealing carrousel and in the case of which it is ensured to a high degree that there are no problems as far as separating the thin membranes/insert parts is

concerned, either when the membranes are received by the transfer station or when the membranes are transferred to the sealing carrousel.

This object is achieved according to the invention by means of an apparatus according to the wording of claim 1.

It is proposed that the transfer station is designed as a cyclically driveable membrane star, and a cutting tool for membrane-strip processing is provided above the membrane star, it being possible for transfer of cut-out membranes from the membrane strip to the membrane star to be effected during a resting phase of the membrane star and for advancement of membranes positioned on the membrane star to the sealing carrousel to be effected during the movement phase of the membrane star.

As a preferred embodiment, the membrane star is intended to have a number of vacuum stations, the individual vacuum stations being designed such that, where the membranes are transferred to/received by the respective sealing head, the stations can be returned via an entry curve.

Membrane-strip processing is thus used as a basis, the membranes cut out of the strip being transferred directly to the rotatable transfer station, namely the cyclically driveable membrane star. As a result, a storage station for membranes/insert parts is generally omitted. This means that problems resulting from such a storage station in the case of very thin parts, such as membranes - for example combining the cut-out parts to form the stack and separating them reliably again from the storage station - do not arise.

For the transfer of the membranes to the membrane star, the membrane star is located in its resting phase, with

the result that the membranes are positioned precisely on the membrane star. On the other hand, membrane transfer from the membrane star to the sealing carrousel takes place in the movement phase of the membrane star. The sealing carrousel can thus be operated continuously throughout, and it is possible to realize a higher throughput speed or throughput rate for membranes which are to be applied to containers.
In order for it to be possible for the membranes placed on the membrane star to be transferred to the individual sealing station, the membrane star overlaps the receiving region of each sealing-carrousel sealing station moved past and, for the purpose of achieving a common path section between the two stations as membranes are transferred/received, is returned via an entry curve on the fixed part of the membrane star.

The membrane-strip feed to the cutting tool is advantageously intended to take place laterally above the membrane star, at a feed angle of approximately 30 degrees.
This makes it possible for the membrane-strip unwinding unit to be positioned laterally on the membrane star.

This also makes it possible, during every second resting phase, for full utilization of the membrane strip to take place, via a double cutting tool, by two membranes being cut out simultaneously and being positioned at the corresponding stations of the membrane star.

For this purpose, ejectors for the cut-out membranes are integrated in each case in the cutting punches of the double cutting tool. These ejectors push the cut parts/membranes to the individual transfer stations on the membrane star, the vacuum stations. This makes it optimally possible for the membranes to be moved reliably to the vacuum stations even in the case of a

relatively high number of cutting-tool strokes and small resting-phase periods of the membrane star.

It is also the case that a vacuum station in the form of a collector/ejector is integrated within each sealing head on the sealing carrousel.

The membranes running into the receiving region in each case on the membrane star are received, during the synchronized running of the membrane star and sealing carrousel, by the sealing-head tool part, which functions as a collector/ejector, by virtue of the vacuum applied at the membrane star being switched off briefly, and, as they approach the collector/ejector, at which a corresponding vacuum is applied, are received and moved to the sealing ring. Here, the membrane placed in the sealing ring, once the cardboard can has been received at the sealing carrousel from the transfer star, is sealed on as operation continues in the sealing carrousel.

Finally, it is possible for the membrane star to be designed such that it can be driven by a step-by-step motion linkage.

The invention is explained in yet more detail hereinbelow with reference to an exemplary embodiment. In the drawing:

a Brief Description of the Drawings:

Figure 1 shows a basic illustration, in plan view, of a cyclically driveable membrane star, membrane-strip processing in the double cutting tool in the resting phase, during cutting of membranes with transfer to the membrane star, sealing carrousel and transfer and receiving star for can bodies,

Figure 2 shows a basic illustration as in figure 1,

but during transfer of a membrane, placed on the membrane star, to the sealing head of the sealing carrousel,

Figure 3 shows a plan view of the membrane strip in the cut state,

Figure 4 shows a plan view of an illustration, partly in section, of the membrane star on the right and the sealing carrousel on the left, and

Figure 5 shows a sectional illustration B-B according to figure 4 with a sealing head receiving a membrane from the membrane star.

a Description of the Preferred Embodiments:

The apparatus for transferring membranes 13 (figure 3) to a continuously operable sealing carrousel 15 for the heat sealing of can-like packaging materials is represented in basic illustrations in plan view according to figures 1 and 2. Figure 1 shows the apparatus, the membrane star 10, in one of the resting phases, and figure 2 shows it in the movement phase.
A double cutting tool 11 is, in principle, arranged above the membrane star 10, which circulates cyclically according to the invention.

This double cutting tool 11, which is indicated as a transversely depicted rectangle, is assigned a membrane strip 12, which can be fed cyclically to the double cutting tool 11 via a membrane-strip unwinding unit (not illustrated). The membrane star 10 has vacuum stations 17 (see figure 4), from 1 to 8, it being the case that, in the basic illustrations according to figures 1 and 2, it is only the course taken by the centers of the individual vacuum stations 1 to 8 which is illustrated in each case on the membrane star 10. Furthermore, the sealing carrousel 15 is depicted in the centre. In this case, the individual vacuum

stations 20 of the sealing heads 18 (see figure 5) are designated by the numbers 1′ to 8′, it also being the case here that it is the course taken by the centers of the vacuum stations 20, in this case moveable over a circular line, which is illustrated. Represented to the right of the sealing carrousel 15 is a transfer star 22 for cardboard cans with transfer stations 1″ to 5″, and represented to the left of the sealing carrousel 15 is a receiving star 23 with the receiving stations 1″ to 5″.

Figure 3 shows a plan view of the membrane strip in the cut state. It can be seen from figure 3 that in each case two membranes 13 are cut out of the membrane strip 12, from the positions designated x, by the double cutting tool 11. As a result of being divided up in this way, the membrane strip 12 is utilized to the optimum extent.
According to figure 1, in the resting phase, the membrane star 10 has its vacuum stations 7 and 8 located precisely beneath the membranes 13 designated x.

Figure 4 shows a plan view of a detail of an illustration, partly in section, of the membrane star 10 and sealing carrousel 15 in the membrane-transfer region 24 according to figure 2, during membrane transfer 13 from the vacuum station 17/3 of the membrane star 10 to the vacuum station 20/3′ of the sealing head 18 (figure 5). A detail of part of the sealing carrousel 15 with the vacuum stations 20/2′, 20/3′ and 20/4′ is shown on the left-hand side.
The vacuum station 20/2′ is located upstream of membrane transfer, the membrane transfer takes place in the central vacuum station 20/3′, and the vacuum station 20/4′ has already received the membrane 13 (not visible).

Four vacuum stations 17/2, 17/3, 17/4 and 17/5 in the membrane-transfer section are shown in detail form on the membrane star 10, the membrane transfer taking place in the vacuum station 17/3. Whereas, accordingly, the vacuum station 17/2 is still occupied by a membrane 13 which is to be fed, the vacuum station 17/4 has already transferred to the vacuum station of the sealing head 20/4′ the membrane 13 previously positioned on it. The directions of rotation of the sealing carrousel 15 and membrane star 10 are indicated by arrow symbols - as is also the case in figures 1 and 2.

Figure 5 shows, in a sectional illustration B-B according to figure 4, the situation when the sealing head 18 of the sealing carrousel 15 receives a membrane from the membrane star 10.
Shown on the left, as in figure 4, is the sealing carrousel 15 and, on the right, the membrane star 10, each in detail form. Also depicted in figure 5 are the vacuum station 17/3 of the membrane star 10 and the vacuum station 20/3′ of the sealing head 18 with the sealing ring 21.
A membrane 13 is located between the two vacuum stations of the membrane star 10 and sealing head 18. The vacuum station 20/3′ is illustrated in a state in which it has been lowered downward from the sealing ring 21, into a collecting position in relation to the vacuum station 17/3 of the membrane star 10, and it receives a membrane 13 from the membrane star 10, i.e. from the vacuum station 17/3 there. Specifically for the purpose of receiving a membrane, it is necessary to have a synchronized-running section between the membrane star 10 and the sealing carrousel 15, the respective vacuum station 17 of the membrane star 10, at this location of transfer to the sealing carrousel 15, being returned by an entry curve 19 to the membrane star 10. The different speeds between the membrane star

10 and sealing carrousel 15 are equalized by the step-by-step motion linkage (not illustrated) at the moment the membrane is transferred/received.
The vacuum applied at the vacuum station 17/3 of the membrane star 10 is switched off whenever the vacuum station of the sealing head, in this case 20/3′, has assumed its position directly diametrically opposite. Since the membrane star 10 is moved cyclically, each vacuum station 17 of the membrane star 10 which passes into the transfer region of the sealing carrousel 15 will, accordingly, move, via an accelerating section 16, into synchronized running with the sealing carrousel 15, as the membrane is received, and will move out of the membrane-transfer region via a decelerating section 16 (figure 1).
According to figure 2, the transfer/synchronized running region is designated as the transfer region by 24.

While the membrane star 10 is thus basically operated cyclically, by a step-by-step motion linkage (not illustrated) executing the abovedescribed movements in the transfer regions to the sealing carrousel 15, in every second standstill position in each case two membranes 13 are cut out of the membrane strip 12, and positioned on the membrane star 10, via the double cutting tool 11.

This provides an apparatus which serves a continuously operated sealing carrousel 15 for the heat sealing of can-like packaging materials, having a rotatable transfer station, which allows a throughput speed of sealable packaging materials in the sealing carrousel which is considerably higher than in the prior art, and which basically involves no problems relating to separating thin membranes/insert parts, since a storage station in the form of membranes stored one above the other is dispensed with.

The operations of the membrane star receiving cut-out membranes from the membrane strip and of membranes being transferred from the membrane star to the sealing tool of the sealing carrousel can both be carried out with a high degree of reliability.